5. Total Maximum Daily Loads

A TMDL prescribes an upper limit on discharge of a pollutant from all sources so as to assure water quality standards are met. It further allocates this load capacity (LC) among the various sources of the pollutant. Pollutant sources fall into two broad classes: point sources, each of which receives a wasteload allocation (WLA); and nonpoint sources, each of which receives a load allocation (LA). Natural background (NB), when present, is considered part of the LA, but is often broken out on its own because it represents a part of the load not subject to control. Because of uncertainties regarding quantification of loads and the relation of specific loads to attainment of water quality standards, the rules regarding TMDLs (Water quality planning and management, 40 CFR Part 130) require a margin of safety (MOS) be a part of the TMDL.

Practically, the margin of safety is a reduction in the load capacity that is available for allocation to pollutant sources. The natural background load is also effectively a reduction in the load capacity available for allocation to human-made pollutant sources. This can be summarized symbolically as the equation: LC = MOS + NB + LA + WLA = TMDL. The equation is written in this order because it represents the logical order in which a loading analysis is conducted. First the load capacity is determined. Then the load capacity is broken down into its components: the necessary margin of safety is determined and subtracted; then natural background, if relevant, is quantified and subtracted; and then the remainder is allocated among pollutant sources. When the breakdown and allocation are completed the result is a TMDL, which must equal the load capacity.

Another step in a loading analysis is the quantification of current pollutant loads by source. This allows the specification of load reductions as percentages from current conditions, considers equities in load reduction responsibility, and is necessary in order for pollutant trading to occur. The load capacity must be based on critical conditions – the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both load capacity and pollutant source loads vary, and not necessarily in concert, determination of critical conditions can be more complicated than it may appear on the surface.

A load is fundamentally a quantity of a pollutant discharged over some period of time, and is the product of concentration and flow. Due to the diverse nature of various pollutants, and the difficulty of strictly dealing with loads, the federal rules allow for “other appropriate measures” to be used when necessary. These “other measures” must still be quantifiable, and relate to water quality standards, but they allow flexibility to deal with pollutant loading in more practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint loads and allow “gross allotment” as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants whose effects are long term, such as sediment and nutrients, EPA allows for seasonal or annual loads.

5.1 In-stream Water Quality Targets

The goal of a TMDL is to restore "full support of designated beneficial uses" (Idaho Code 39.3611, 3615). In order to do so, appropriate water quality targets for pollutants must be used. These targets must be quantifiable in order to determine the loading capacity of a water body. For example, the narrative water quality standard for nutrients is translated into a measurable water quality target designed to support beneficial uses.

Temperature

The most common surrogate target for a temperature TMDL is percent effective shade. The height and density of the potential natural vegetation is compared against the width of the stream to gauge the percent effective shade achievable for that stream. Effective shade is defined as that amount able to counteract the heating effects of solar radiation on the surface water temperature.

For the Little Salmon River Meadows Valley temperature TMDL, a potential natural vegetation (PNV) approach is utilized. It is assumed that shade is maximized and solar loading is minimized to a stream under PNV. Thus, stream temperatures are at their lowest achievable levels under PNV. The PNV approach is described below. Additionally, the procedures and methodologies to develop PNV target shade levels and to estimate existing shade levels are described in this section.

Potential natural vegetation (shade) was used as a surrogate for temperature because this would achieve natural background conditions. The temperature targets are based on IDAPA 58.01.02.200.09 which states that "when natural background conditions, exceed any applicable water quality criteria set forth in Sections 21, 250, 251 or 253, the applicable water quality criteria shall not apply; instead pollutant levels shall not exceed the natural background conditions." In laymen's terms, the temperature targets are based on a natural riparian plant cover condition over the stream. In this TMDL, the potential natural vegetation cover represents the loading capacity of the streams in terms of minimum heat load. This analysis contains an implicit margin of safety as all streams are assumed to be at potential natural vegetation when in reality natural cover can be more variable due to natural forces. Existing vegetative cover represents the existing load of heat to the streams.

Potential Natural Vegetation for Temperature TMDLs

There are several important contributors of heat to a stream including ground water temperature, air temperature and direct solar radiation (Poole and Berman 2001). Of these, direct solar radiation is the source of heat that is most likely to be controlled or manipulated. The parameters that affect or control the amount of solar radiation hitting a stream throughout its length are shade and stream morphology. Shade is provided by the surrounding vegetation and other physical features such as hillsides, canyon walls, terraces, and high banks. Stream morphology affects how closely riparian vegetation grows together and water storage in the alluvial aquifer. The shade effectiveness of riparian vegetation is also affected by stream orientation which is accounted for in the solar pathfinder measurements. The amount of shade provided by objects other than vegetation is not easy to change or manipulate. Vegetation and morphology remain as the most likely sources of change in solar loading and, hence, temperature in a stream. In hydrologically modified systems, flow alteration also influences stream temperature.

Depending on how much vertical elevation also surrounds the stream, vegetation further away from the riparian corridor can provide shade. However, riparian vegetation provides a substantial amount of shade on a stream by virtue of its proximity. Stream shade can be measured in a number of ways. Effective shade, that shade provided by all objects that intercept the sun as it makes its way across the sky, can be measured in a given spot with a solar pathfinder. Effective shade can also be modeled using detailed information about riparian plants and their communities, topography, and the stream's aspect.

Potential natural vegetation (PNV) along a stream is that intact riparian plant community that has grown to its fullest extent and has not been disturbed or reduced in anyway. The PNV can be removed by disturbance either naturally (wildfire, disease/old age, wind-blown, wildlife grazing) or anthropogenically (domestic livestock grazing, vegetation removal, erosion). The idea behind PNV as targets for temperature TMDLs is that PNV provides the most shade and minimizes solar loading to the stream. Anything less than PNV results in the stream heating up from additional solar inputs (excess heat load). PNV is estimated from models of plant community structure (shade curves for specific riparian plant communities), and existing vegetative cover or shade is measured in the field or estimated using aerial photo analysis. Comparing the two will tell us how much excess solar load the stream is receiving, and what can be done to decrease solar gain.

Using information from the infrared flyover, hydrology data and temperature logger information, DEQ determined that tributary influences were negligible from Four Mile Creek to Round Valley Creek due to the volume of the Little Salmon River at that point. In other words, stream temperature would not be changed because the volume of the incoming tributaries is too small to make a difference. Thus, tributary shading estimates are included from upstream of Four Mile Creek. Tributary shading was investigated for tributaries both in the 303(d) listed section of the watershed as well as upstream of the listed watershed in the fourth order and third order sections. These shading estimates for tributaries outside the listed reach are included because cooler water from these streams could potentially provide cooling to the Little Salmon River. The information for these streams is included in Appendix D.

Existing shade or cover was estimated for the Little Salmon River from just above Vick Creek to just below Round Valley Creek and for major tributaries to the river in this meadows area (Vick, Mill, Mud, Big, Little, Goose, and Threemile Creeks) from visual observations of aerial photos. Estimates were field verified in several forested sections as well as meadow sections by measuring shade with a solar pathfinder at systematically located points along the streams (see below for methodology). If further field verified shading information becomes available, it will be incorporated into the TMDL and the loading estimates will be revised to better reflect the actual conditions.

PNV targets were determined from an analysis of probable vegetation and comparing that to shade curves developed for similar vegetation communities in other TMDLs. A shade curve shows the relationship between effective shade and stream width. As a stream gets wider, the shade decreases as the vegetation has less ability to shade the center of wide streams. As the vegetation gets taller, the more shade the plant community is able to provide at any given channel width. Existing and PNV shade was converted to solar load from data collected on flat plate collectors at the nearest National Energy Research Laboratory weather stations collecting these data. In this case, the nearest station at Boise, ID was used. The difference between existing and potential solar load, assuming existing load is higher, is the load reduction necessary to bring the stream back into compliance with water quality standards. PNV shade and loads are assumed to be the natural condition, thus stream temperatures under PNV conditions are considered to be the lowest achievable temperatures (so long as there are no point sources or any other anthropogenic sources of heat in the watershed).

Pathfinder Methodology

The solar pathfinder is a device that allows one to trace the outline of shade producing objects on monthly solar path charts. The percentage of the sun's path covered by these objects is the effective shade on the stream at the spot that the tracing is made. In order to adequately characterize the effective shade on a reach of stream, ten traces should be taken at systematic or random intervals along the length of the stream in question.

Aerial Photo Interpretation

Canopy coverage estimates or expectations of shade based on plant type and density are provided for 200-foot elevation intervals or natural breaks in vegetation density, marked out on a 1:100K hydrography. Each interval is assigned a single value representing the bottom of a 10% canopy coverage or shade class as described below (*adapted from the CWE process, IDL, 2000)*:

Cover class	Typical vegetation type
0 = 0 – 9% cover	agricultural land, denuded areas
10 = 10 –19%	ag land, meadows, open areas, clearcuts
20 = 20 – 29%	ag land, meadows, open areas, clearcuts
30 = 30 – 39%	ag land, meadows, open areas, clearcuts
40 = 40 – 49%	shrublands/meadows
50 = 50 – 59%	shrublands/meadows, open forests
60 = 60 – 69%	shrublands/meadows, open forests
70 = 70 – 79%	forested
80 = 80 – 89%	forested
90 = 90 –100%	forested

The visual estimates of shade in this TMDL were field verified with a solar pathfinder. The pathfinder measures effective shade and is taking into consideration other physical features that block the sun from hitting the stream surface (e.g. hillsides, canyon walls, terraces, man-made structures). The estimate of shade made visually from an aerial photo does not take into account topography or any shading that may occur from physical features other than vegetation. However, research has shown that shade and cover measurements are remarkably similar (OWEB, 2001), reinforcing the idea that riparian vegetation and objects proximal to the stream provide the most shade.

Stream Morphology

Measures of current bankfull width or near stream disturbance zone width may not reflect widths that were present under PNV. As impacts to streams and riparian areas occur, width-to-depth ratios tend to increase such that streams become wider and shallow. Wider streams mean less vegetative cover to provide shading.

Shade target selection, which involves evaluating the amount of shade provided at PNV conditions, necessitates recognition of potential natural stream widths as well. In this TMDL appropriate stream widths for shade target selection were determined from analysis of existing stream widths and the relationship between drainage area and width-to-depth ratios (Rosgen, 1996). The drainage area associated with the Little Salmon River meadows area varies from 16 square miles for the drainage upstream of Mud Creek (includes Vick and Mill Creeks) to 196 square miles for the drainage area downstream to and including Round Valley Creek. Based on the relationship between drainage area and bankfull widths (Figure 73), it was estimated that the Little Salmon River natural widths varied from seven meters (~23 feet) to 25 meters (~82 feet) in the meadows area.

Each tributary drainage was evaluated similarly from its headwaters, where natural widths are about one meter (3.28’), to its mouth. Tributary drainage areas ranged from seven square miles for Threemile Creek to 40 square miles for the Goose Creek drainage.

Corresponding natural stream widths at mouths varied from five meters to 12 meters (16.4 feet to 39.37 feet). The Goose Creek drainage is unusual in that flows out of Goose Lake, an irrigation supply reservoir, are a constant 100cfs during the irrigation season. As a result, stream widths are much larger below the reservoir and field measured widths (~15m or 49’) were used for the upper Goose Creek section. However, widths decrease in the Meadows Valley area and, thus, natural drainage size was used to determine widths of East Branch and West Branch Goose Creek below irrigation diversions.

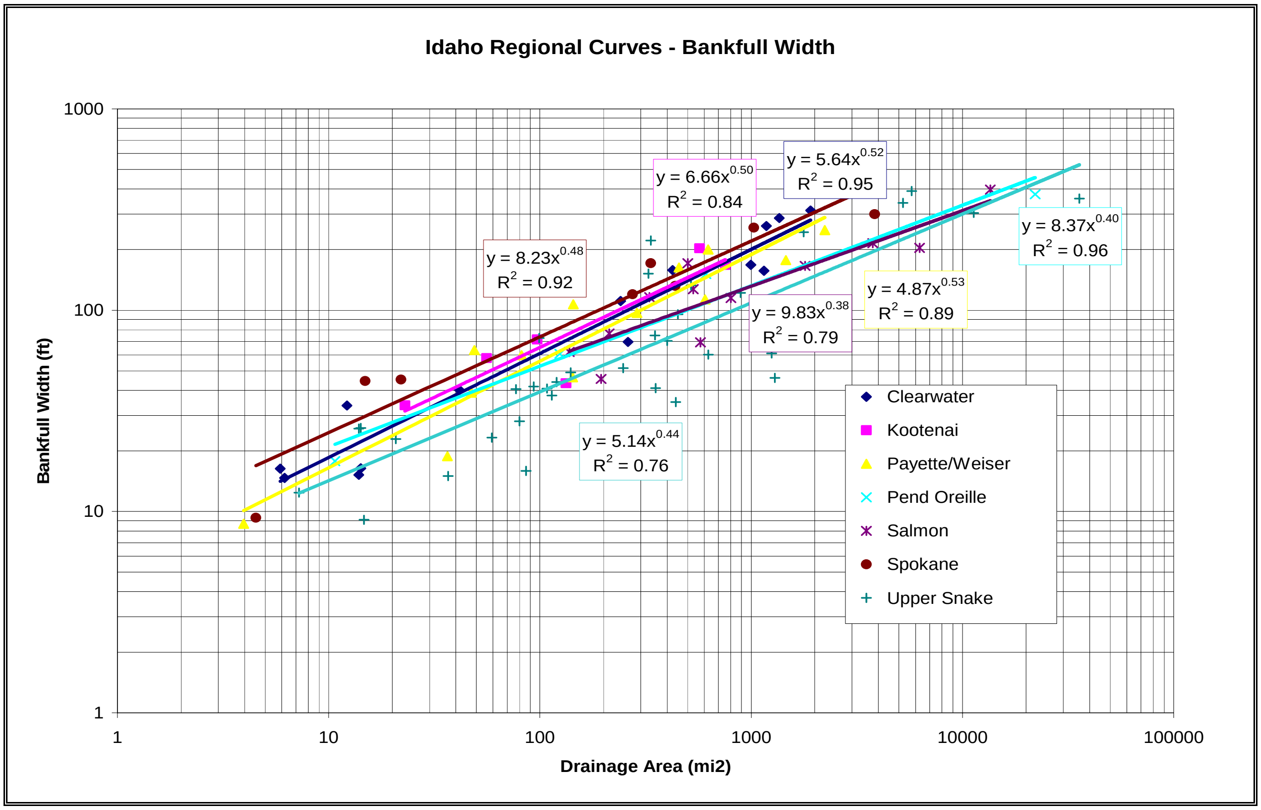

Figure 73. Bankfull Width as a Function of Width to Depth Ratio and Drainage Area.

Table 34. Drainage Area Size and Stream Width.

Drainage	Area (acres)	Area (miles^2)	Natural width (m)
Little Salmon River, above Mud Creek	10,308	16.1	7 (23')
Little Salmon River above Round Valley	125,491	196	25 (82')

Design Conditions

The critical period for temperature is during spring and summer. This is the period when aquatic organisms are most vulnerable to stress caused by elevated temperatures. Spring is included to account for spawning temperatures. Exceedance of the coldwater aquatic temperature standard is primarily seen during the summer months.

The Little Salmon River in the Meadows Valley area flows sinuously from the south to the north through a low gradient high mountain meadow. The dominant shade producing vegetation is willow (*Salix sp.*) most likely one of the mid-elevation species such as Scouler's willow (*S. scouleriana*), Bebb's willow (*S. bebbiana*), or Geyer's willow (*S. geyeriana*). These willows are generally up to six meters tall, and the density in and around the Little Salmon River is estimated at 75% under potential natural vegetation conditions. The shade curves used had an average height of willows of 10 feet (the height of the willows ranged from 6 feet to 18 feet).

Target Selection

The potential natural vegetation along streams in the meadow area of the Little Salmon River is assumed to consist of four community types; forest, forest/shrub mix, willow-like shrub/grass meadow, and grass/willow meadow. To determine potential natural vegetation shade targets for the Little Salmon River and its meadow tributaries, effective shade curves from several existing temperature TMDLs were examined. These TMDLs had previously used vegetation community modeling to produce these shade curves. Curves for the most similar vegetation type were selected for shade target determinations. Because no two landscapes are exactly the same, shade targets were often derived by taking an average of the various shade curves available. Effective shade curves include percent shade on the vertical axis and stream width on the horizontal axis. As a stream becomes wider, a given vegetation type looses its ability to shade wider and wider streams.

For the forest community type the following shade curve was used:

- the Ponderosa pine/common chokecherry type from the Crooked Creek TMDL (IDEQ, 2002),

For the forest/shrub mix community type the following shade curves were used:

- the conifer/deciduous type from the Walla Walla River TMDL (ODEQ, 2004b),
- the Qg1 geomorphic surface type from the Willamette River TMDL (ODEQ, 2004a), and
- the black cottonwood-pacific willow type from the Alvord Lake TMDL (ODEQ, 2003).

For the willow-like shrub/grass community type the following shade curves were used:

- the coyote willow meadow type from the Crooked Creek TMDL (IDEQ, 2002),
- the Trout Creek Mtns. Willow community type from the Alvord Lake TMDL (ODEQ, 2003), and
- the Ow savanna-prairie type from the Willamette River TMDL (ODEQ, 2004a).

For the grass/willow mix type the following shade curves were used:

- the tufted hairgrass meadow type from the Crooked Creek TMDL (IDEQ, 2002),
- the Ow savanna-prairie type from the Willamette River TMDL (ODEQ, 2004a), and
- the co-dominant mesic graminoid-willow community type from the Alvord Lake TMDL (ODEQ, 2003).

The average shade targets derived from the above TMDLs at various stream widths needed for the Little Salmon River TMDL are presented in Table 35. Shade targets for the forest type vary little over the range of stream widths examined due to tree height. Targets vary considerably more over the range of stream widths as plant height decreases in subsequent community types.

Table 35. Target Percent Shade (as a fraction) for Four Community Types at Varying Stream Widths.

Type	1-2m (3.3-6.6')	3m (9.8')	4m (13.1')	5m (16.4')	7m (23)	9m (29.5')	12m (39.4')	14m (45.9')	15-16m (49.1-52.5')	18-25 m (59-82')
Forest	0.8								0.5	
Forest/ Shrub	0.8	0.8	0.8	0.7	0.7		0.6		0.5	
Willow	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1
Grass/ Willow		0.2	0.2	0.1	0.1	0.1	0.1			

Monitoring Points

Effective shade monitoring can take place on any reach throughout the Little Salmon River and meadows tributaries and compared to estimates of existing shade seen in Figure 77 and described in Tables 37 and Appendix D. Those areas with the lowest existing shade estimates in relation to their target shade should be monitored with solar pathfinders to verify the existing shade levels and to determine progress towards meeting shade targets.

Margin of Safety

The margin of safety in this TMDL is considered implicit in the design. Because the target is essentially background conditions, there are no loads allocated to sources or activities. Although the loading analysis used in this TMDL involves gross estimations that are likely to have large variances, there are no load allocations that may benefit or suffer from that variance. Using potential natural vegetation is inherently conservative given the generally variable distribution and age classes of riparian plants. Potential natural vegetation assumes that all plants are at potential when naturally there will be variation from these optimum shading numbers due to age of plants, soil types etc. Essentially, greater shading is assumed to occur than would be expected under natural conditions.

Seasonal Variation

This TMDL is based on average summer loads. All loads have been calculated to be inclusive of the six month period from April through September. This time period was chosen because it represents the time period when the combination of increasing air and water temperatures coincides with increasing solar inputs and increasing vegetative shade. Water temperature is not likely to be a problem for beneficial uses outside of this time period because of cooler weather and lower sun angle

5.2 Load Capacity

The loading capacity for a stream under PNV is essentially the solar loading allowed under the shade targets specified for the reaches within that stream. These loads are determined by multiplying the solar load to a flat plat collector (under full sun) for a given period of time by the fraction of the solar radiation that is not blocked by shade (i.e. the percent open or 1-percent shade). In other words, if a shade target is 60% (or 0.6), then the solar load hitting the stream under that target is 40% of the load hitting the flat plate collector under full sun.

Solar load data for flat plate collectors was obtained from the nearest National Renewable Energy Laboratory (NREL) weather stations in Boise, ID. The solar loads used in this TMDL are spring/summer averages, thus, an average load is calculated for the six month period from April through September. These months coincide with the time of year that stream temperatures are increasing and critical periods for salmonid spawning.

Table 36 shows the PNV shade targets (identified as Target or Potential Shade) and the corresponding potential summer load (in kWh/m^2/day and kWh/day) that serve as the loading capacity.

For the Little Salmon River meadows area, we have used the same willow community PNV with varying stream widths to produce shade targets from 40% (0.4) to 10% (0.1) for the reach from Vick Creek to Round Valley Creek (Tables 34 and 35).

5.3 Estimates of Existing Pollutant Loads

Regulations allow that loadings "...may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading," (Water quality planning and management, 40 CFR § 130.2(I)). An estimate must be made for each point source. Nonpoint sources are typically estimated based on the type of sources (land use) and area (such as a subwatershed), but may be aggregated by type of source or land area. To the extent possible, background loads should be distinguished from human-caused increases in nonpoint loads.

Existing loads in this temperature TMDL come from estimates of existing shade as determined from aerial photo interpretations. Like target shade, existing shade was converted to a solar load by multiplying the fraction of open stream by the solar radiation measured on a flat plate collector at the NREL weather stations. Existing shade data are presented in Figure 74.

Existing shade varied from 30% to 0% along the Little Salmon River in the meadows area (Figure 2 and Table 3). Solar pathfinder data (average shade 'April through September') taken at three sections of the river verified the accuracy of the aerial photo interpretation. Like loading capacities (potential loads), existing loads in Table 36 are presented on an area basis (kWh/m^2/day) and as a total load (kWh/day).

Table 36. Existing and Potential Solar Loads for Little Salmon River from Vick Creek to Round Valley Creek.

Segment Length (~miles)	Existing Shade (fraction)	Existing Summer Load (kWh/m2/day)	Target or Potential Shade (fraction)	Potential Summer Load (kWh/m2/day)	Potential Load minus Existing load (kWh/m2/day)	**Little Salmon (above Vick to below Round Valley)**
0.3	0.2	5.104	0.4	3.828	-1.28	Willow-23' wide
0.2	0.3	4.466	0.4	3.828	-0.64	Willow-23' wide
0.4	0.1	5.742	0.4	3.828	-1.91	Willow-23' wide
0.2	0.2	5.104	0.4	3.828	-1.28	Willow-23'wide
0.4	0.3	4.466	0.4	3.828	-0.64	Willow-23' wide
0.9	0.1	5.742	0.4	3.828	-1.91	Willow-23' wide
1.2	0.1	5.742	0.3	4.466	-1.28	29.5' wide
1.6	0.1[a]	5.742	0.2	5.104	-0.64	45.9' wide
4.8	0[b]	6.38	0.2	5.104	-1.28	52' wide
0.9	0.1	5.742	0.2	5.104	-0.64	59 ' wide
1.8	0	6.38	0.2	5.104	-1.28	65' wide
1	0.2[c]	5.104	0.2	5.104	0.00	72'wide
0.6	0	6.38	0.2	5.104	-1.28	72' wide
0.2	0.1	5.742	0.2	5.104	-0.64	82'wide
0.8	0	6.38	0.2	5.104	-1.28	82' wide
Segment Length (feet)	Segment Area (feet2)	Existing Summer Load (kWh/day)	Natural Stream Width (ft)	Potential Summer Load (kWh/day)	Potential Load minus Existing Load (kWh/day)	
1584.2	36368.8	17250	23	12937	-4312	
1056.2	24107.1	10062	23	8625	-1437	
2112.3	48484.6	25874	23	17250	-8625	
1056.2	24107.1	11500	23	8625	-2875	
2112.3	48484.6	20125	23	17250	-2875	
4749.4	109095.6	58217	23	38812	-19406	
6333.7	187019.6	99801	29.5	77623	-22178	
8446	387887.2	206995	45.9	183996	-22999	
2533.8	1329914.5	788553	52	630842	-157711	
4749.4	249363	149702	59	118283	0	
9502.2	498715.2	369634	65	236566	-36963	
5277.5	27552.5	180710	72	131425	22589	
3168.5	166242	135533	72	78855	-13553	
1056.2	55414	46204	82	26285	0	
4221.4	221656	205352	82	105140	-20535	**% Reduction**
Total	**3664178.1**	**2,325,512**		**2,034,631**	**-365,630**	**-13**

a = solar pathfinder measured 0% shade; b = solar pathfinder measured 0% shade; c = solar pathfinder measured 22.5% shade.

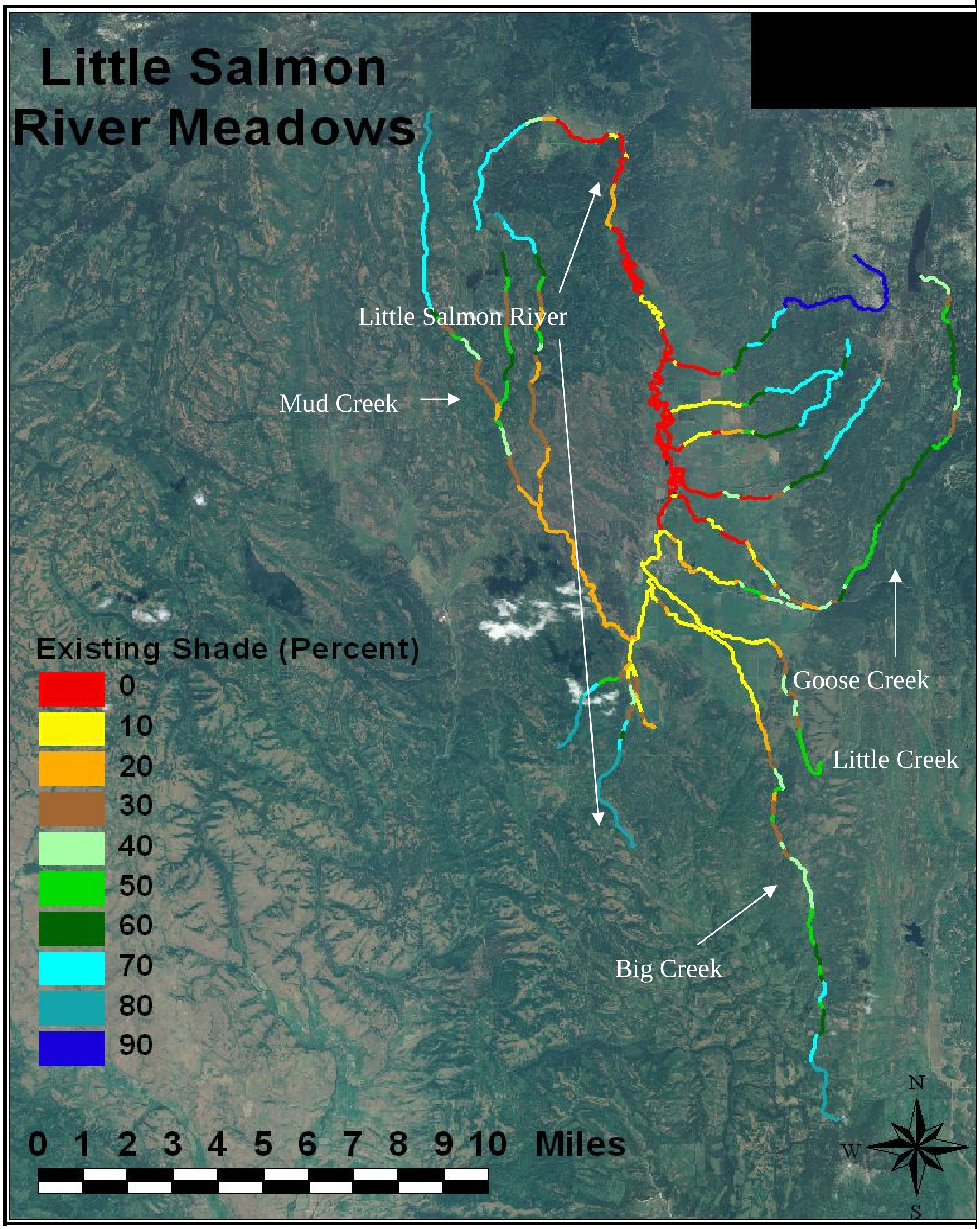

Figure 74. Existing Shade Estimated for Little Salmon River and its Meadow Tributaries by Aerial Photo Interpretation.

5.4 Load Allocation

Because this TMDL is based on potential natural vegetation, which is equivalent to background loading, the load allocation is essentially given to background. Load allocations are therefore stream reach specific and are dependent upon the target load for a given reach. Table 36 shows the target or potential shade, which is converted to a potential summer load by multiplying the inverse fraction (1-shade fraction) by the average loading to a flat plate collector for the months of April through September. That is the loading capacity of the stream and it is allocated completely to background. There is no opportunity to allocate shade removal to different human activities.

Generally, existing solar loads exceed potential solar because existing shade is less than potential shade. The Little Salmon River itself from Vick Creek to Round Valley Creek showed a moderate amount of excess load requiring a reduction to meet target loads. The river's existing solar load is 2,325,512 kWh/day and its target load should be 2,034,631 kW/day. The difference (-290,882 kWh/day) shows that loads on the Little Salmon River need to decrease by about 13% to achieve background conditions. This 13% is an overall average for the entire system not the implementation target for each individual reach. In actuality, shading varies between the individual reaches.

Practically speaking in implementation, a landowner could evaluate the current shade with a solar pathfinder and then compare that to the predicted potential shade using the tables/maps in this document to see what the difference, if any, between the two measurements is. Or landowners can confer with SCC or IASCD staff to determine if their riparian area is at system potential.

In addition, since tributaries have the potential to contribute excess thermal load, information on tributary loading is included in Appendix D. These streams are not receiving allocations due to uncertainties with actual thermal load delivered due to flow management considerations. The flow is managed during the summer months and several of these tributaries may not contribute enough flow to make a difference to Little Salmon River in-stream temperatures. Further, several of these tributaries may also meet the cold water aquatic life temperature standard. However, this information is necessary for use in developing the implementation plan.

Wasteload Allocation

A temperature wasteload allocation is shown in Table 37 for the New Meadows wastewater treatment plant based on base flow conditions and maximum design flow. Effluent temperature information was not available during the critical period. Temperature monitoring is required for effluent discharge to ensure compliance with the TMDL. This TMDL is based on the water quality standard for point sources which states that "no temperature increase will be allowed which raises the receiving water temperature greater than 0.3 degrees C". The temperature shown will not result in an increase in 0.3 degrees Celsius in the stream when cold water criteria are applicable assuming an ambient in-stream temperature of 19 degrees Celsius. The state water quality criteria for temperature, (19 degrees Celsius maximum average daily temperature), was used to calculate this load allocation.

Table 37. Wasteload allocation for New Meadows Wastewater Treatment Plant (WWTP)

Location	Allowable Effluent Temperature (C)	Base Flow (cfs)	Facility Design Flow (cfs)	Current Effluent Temperature
New Meadows WWTP	20.8	10	0.55	n/a

Reserve

An explicit reserve for future growth has not been set aside within the TMDL. Any increased discharge from future growth or development within the watershed should be consistent with these allocations.

Nutrients

Design Conditions

The critical period for nutrients is during summer from June 21st through September 22nd when aquatic organisms are most vulnerable to stress caused by excess nutrients. Nuisance algal growth and low dissolved oxygen are seen only in the summer months. Summer is also the period that was analyzed by Dodds et al. 1998 in his work on chlorophyll-a/TP targets for nuisance periphyton control. This period captures the low flow, higher temperature, and higher nutrient period when periphyton growth is most likely to occur.

Target Selection

This TMDL focuses in particular on periphyton, the algae that is found attached to rocks, wood and other materials in the stream, because the Idaho Department of Agriculture reported that they had seen nuisance levels of periphyton during their biweekly monitoring in late summer 2004. A number of factors besides nutrient levels influence algal densities in water bodies. These include, but are not limited to, the type of algae, stream flow patterns and scouring, water temperature and velocity, light intensity, and grazing by aquatic insects. From a management perspective, factors other than nutrients are difficult to control. Using a data base consisting of over 200 sample sites to relate algal densities to nutrient concentrations, Dodds et al 1998 were able to create a trophic state stream classification based on nutrients and benthic chlorophyll-a.

Using total phosphorus data and benthic chlorophyll-a data, a target was selected that would result in mean chlorophyll-a concentrations of less than 100 mg/m^2. Nuisance levels of periphyton have been determined to exist at mean levels exceeding 100 mg/m^2. Thus, benthic chlorophyll-a levels less than this are indicative of acceptable conditions with regard to benthic algal biomass (Dodds 1997).

0.075 mg/L of total phosphorus is the concentration of total phosphorus that was determined to represent the boundary between mesotrophic and eutrophic conditions. 0.075 mg/L is used as a preliminary target (benthic chlorophyll-a data from the watershed is not available yet) and is based on Dodds work in determining trophic boundary states in streams. This level of total phosphorus is correlated to a mean chlorophyll-a concentration of 70 mg/m^2. Thus, this target is conservative since mean chlorophyll-a levels would remain below the nuisance level threshold and is assumed to result in dissolved oxygen concentrations that are above the 6 mg/L standard at all times.

Background

Natural background concentrations of total phosphorus were determined by sampling the headwaters of the Little Salmon River directly below where the river originates from springs. The background level of total phosphorus is 0.02 mg/L, which is similar to background total phosphorus concentrations found in the Idaho Batholith. The resultant background load is 3.28 kg/day for the Little Salmon River and 0.49 kg/day for Big Creek.

Existing Pollutant Loads

Total phosphorus was monitored in 2004 and 2005 in both Big Creek and the Little Salmon River. The existing pollutant load was calculated using 2004 data because the 2005 dataset was not complete at the time of this. The existing load is 10.16 kg/day for the Little Salmon River and 2.30 kg/day for Big Creek and was determined by a direct load calculation using average summer flow and average summer total phosphorus concentrations.

Monitoring Points

Monitoring sites for the Little Salmon River are shown in Figure 22 in Section 3. Total phosphorus was measured at stations LSR 3, 4 and 5 during the summer of 2004. In 2005, total phosphorus was measured at LSR 3, LSR4 and LSR at Meadow Creek. In addition, several tributaries were monitored for phosphorus. When this information becomes available, it will be used in creating the implementation plan. Since, more detailed information on phosphorus transport was not available, LSR 3, the most downstream monitoring station was selected as the compliance point for the TMDL and loads were determined for this station.

Big Creek monitoring sites (Idaho Department of Agriculture sites BC1 and BC2) are shown in Figure 30.

Margin of Safety

The total phosphorus target selected contains an implicit margin of safety because the corresponding mean chlorophyll-a concentration is below the 100 mg/m^2 level of chlorophyll-a that is shown to be associated with nuisance periphyton growth.

Seasonal Variation/Critical Condition

The TMDL addresses critical conditions by deriving allocations from the period of highest concentration and lowest flow. Excess algal growth and associated depressed dissolved oxygen are seen only during the summer time period determined by this TMDL as the critical period. Recreation and cold water aquatic life are impaired by excess algal growth and low dissolved oxygen in the summer period only.

Load Capacity/Load Allocation

Load capacity was determined for total phosphorus at LSR 3 using the target concentration (0.075 mg/L), natural background concentration (0.02 mg/L) and average summer flow (67 cfs) as shown in Table 38. The same methodology was applied at Big Creek except that an average summer flow of 10 cfs was used. This can be summarized symbolically as the equation: LC = MOS + NB + LA + WLA. The margin of safety is assumed to be implicit in the adoption of a conservative target for total phosphorus and is not included in the table. This load capacity was determined using 2004 information which was the only complete dataset available. Table 38 shows the load capacity for total phosphorus. The load capacity was determined using LSR 3 at the downstream end of the listed reach where the maximum load is expected due to the highest flows being seen at this point. The load capacity for Big Creek was determined using BC1 which was the most downstream sampling point. The reductions for Big Creek are significant and, thus, a phased approach will be taken in implementation. E.g. a higher target of 0.1 mg/L TP will be employed first, and the results of reducing total phosphorus levels to this amount will be evaluated (this would be an initial 21 percent reduction in pollutants).

Because source specific loading information was not available, the nonpoint allocations are gross allotments to all nonpoint sources within the reach upstream of LSR 3 and also for that upstream of BC1.

While these load values are helpful in giving a relative understanding of the reductions required, and will apply reasonably over most water years, it should be noted that the absolute level of reduction required will depend on flow and concentration values specific to a given water year. The target shown to result in attainment of water quality standards and support of designated uses in the reach is an in-stream concentration of less than or equal to 0.075 mg/L TP. The load capacity is calculated using the target of 0.075 mg/L TP. Transport and deposition of phosphorus, and the resulting algal growth within the reach, is seasonal in nature. Therefore, application of the target is also seasonal in nature, extending from the beginning of June 21st through September 22nd (summer). The length of this period was also determined by when BMPs would be most effective. Due to water column nutrients, particularly TP, being more abundant than plant uptake rates, responses by plant communities to management efforts will take time.

Table 38. Load Allocation for Nutrients (Total Phosphorus): Little Salmon River (Big Creek to Round Valley Creek) at LSR 3 and Big Creek (BC1)

Location	Load Capacity (kg/day)	Natural Background (kg/day)	Load Allocation (kg/day)	Wasteload Allocation kg/day	Existing Pollutant Load (excludes natural background) (kg/day)	% Reduction Necessary for Nonpoint Sources
Little Salmon River	12.3	3.28	8.91	.1	10.16	12
Big Creek	1.84	0.49	1.35	0	2.3	41

Wasteload Allocation

The wasteload allocation for the New Meadows Waste Water Treatment Plant is 3 kg/month although it is shown in kg/day in Table 38. The wasteload allocation is based on a maximum design capacity flow of 0.055 cfs and the 0.075 mg/L total phosphorus target. This allocation applies during summer only.

This load allocation was developed based on information given to DEQ in 2005 by the Wastewater Treatment plant operator. The operator indicated that at full capacity, the treatment plant would be unlikely to discharge during summer. The City of New Meadows has recently hired a new operator and if the city determines that the treatment plant may have to discharge more frequently in summer then a new wasteload allocation will be developed in consultation with the WAG. If the treatment plant is upgraded or expanded this may also trigger a new wasteload allocation. All wasteload allocations will be developed in consultation with the WAG and a new or modified NPDES permit would be developed and issued by EPA.

Reserve

An explicit reserve for future growth has not been set aside within the TMDL. The wasteload allocation was calculated at maximum design capacity resulting in an inherent reserve for growth since the plant is not at maximum capacity. As the city of New Meadows grows and reaches design capacity, different methods (pollutant trading, biological nutrient filtration, land application) should be investigated in order to ensure continued compliance with the TMDL.

Any increased discharge from future growth or development within the watershed should be consistent with these allocations.

Bacteria

Design Conditions

The critical period for bacteria is during summer from June 21st through September 22nd. This is the period when bacteria concentrations are elevated above the standard and also when people are most likely to be engaging in recreational activities that would result in the ingestion of water. This period correlates to the periods of lowest flow and highest temperatures.

Target Selection

The bacteria target is based on the numeric standard which has been used to establish the load capacity and subsequent pollutant allocations. Bacteria sources have not been delineated in this TMDL, because this information was not available. Thus, the load may include bacteria from wildlife.

The criteria for *E. coli* concentrations in Idaho WQS intended to protect the primary contact recreation beneficial use are:

- not to exceed 406 *E. coli* organisms (cfu)/100 ml at any time
- not to exceed a geometric mean of 126 *E. coli*(cfu)/100 ml[a] based on a minimum of 5 samples taken every 3 to 5 days over a 30 day period;

The criteria for *E. coli* concentrations in Idaho WQS intended to protect the secondary contact recreation beneficial use are:
• not to exceed 576 cfu per 100 ml at any time, and
• not to exceed a geometric mean of 126 cfu per 100 ml based on a minimum of 5 samples taken every 3 to 5 days over a 30-day period.

The primary recreation contact standard applies to the Little Salmon River and the secondary contract recreation standard applies to Big Creek. Low flows and lack of recreational access make primary contact recreation unlikely in Big Creek. Thus, since it is undesignated, secondary contact recreation is presumed to be the beneficial use. For compliance purposes during implementation, the secondary contact recreation standard of 576 cfu per 100 mL will be used for monitoring of Big Creek unless it is feasible to take 5 samples over 30 days.

Monitoring Points

Bacteria was monitored throughout the Little Salmon River watershed. Monitoring locations are discussed for the Little Salmon River in Section 2 for nutrients and bacteria and shown in Figure 22 (Idaho Department of Agriculture sites). Loads were calculated for LSR 3 and LSR 4, because these were the upstream and downstream points of where bacteria violations took place. Loads were also calculated for Big Creek at BC 1 and the Idaho Department of Agriculture monitoring location is shown in Figure 30.

Margin of Safety

The federal statute requires that a margin of safety be identified to account for uncertainty when establishing a TMDL. The margin of safety can be explicit in the form of an allocation, or implicit in the use of conservative assumptions in the analysis. One approach to setting a margin of safety is to set allocations based on conditions during the most critical period. In the above analysis of Little Salmon River bacteria data, the summer months are the critical period where E. coli standards are not being met and when primary and secondary contact recreation is most likely to take place. Setting the loading capacity based on the most critical month will be protective of the other months of the year when standards are currently met. Using the critical period will serve as the inherent margin of safety for this TMDL.

An implicit MOS has been incorporated into the TMDL by utilizing conservative assumptions. The period of lowest flows was used to estimate the LC. This method results in a LC far below that needed to achieve criteria during 9 months of the year. Further, the low flow period chosen was based on current data during a low water year, further increasing the inherent level of conservatism in the assumptions.

Seasonal Variation/Critical Condition

The TMDL addresses critical conditions by deriving allocations from the period of highest concentration and lowest flow. Summer is the period when bacteria is in violation of the state standard and also the period when recreation is most likely to take place in this section of the watershed.

Load Capacity/Load Allocation

The LC is the greatest amount of pollutant loading a water body can receive and still meet WQS. The LC will vary with flow, that is, at higher flows a water body can accept greater loading and still comply with criteria. The LCs were estimated for two sampling locations (LSR 3 and LSR 4) using the average flow recorded during July and August, the lowest flow months of the year, multiplied by the monthly mean *E. coli* criteria of 126 cfu/100 ml. While elevated concentrations of *E. coli* occur during periods of high runoff (e.g., in May), the LC was established utilizing the low flow period because a much lower bacteria loading is necessary in order to remain in compliance with established criteria. This establishes a margin of safety.

Table 39 lists LCs at the two sampling locations used to establish the monthly criteria. The loading is presented in terms of colony forming units per day. This is not a very practical measure as there is seldom information from which to estimate such daily loads. As a result, the allocations include the percent reduction in bacteria loading needed to achieve the LC in addition to the numeric criteria.

Nonpoint source allocations and WLAs are presented in Table 38 and 39. Because source specific loading information was not available, the nonpoint allocations are gross allotments to all nonpoint sources within the reach upstream of each point.

Allocations were established at the same loading and concentration as the LC without an explicit margin of safety. Due to the lack of sufficient information, it was not possible to differentiate background loading from anthropogenic loading, so background loading is included within the gross allocation to nonpoint sources. The percent reduction needed to achieve nonpoint source LAs is also shown, in order to provide some perspective on the magnitude of source control needed during the critical period.

Table 39. Bacteria Load Capacity and Allocation for Little Salmon River and Big Creek.

Location	Target (cfu/100 mL)	Critical Flow (CFS)	Load Capacity (cfu/day)	Geometric Mean (existing concentration) (cfu/100 mL)	Existing Load (cfu/day)	% Reduction
LSR 3	126	49.48	1.52 E 11	254	3.07 E 11	50
LSR 4	126	16.54	5.1 E 10	1566	6.34 E 11	92
BC1	126	11.62	3.58 E 10	2155	6.13 E 11	94

Wasteload Allocation

The WLA for the New Meadows WWTP is established at the level of the applicable water quality criteria for *E.* coli as shown in Table 40. The monthly geometric mean limit of 126 cfu/100 ml is the same as in NPDES permits for other wastewater facilities. These limits are expected to be incorporated into New Meadow’s permit when it is reissued. Existing loads are not shown for the New Meadows WWTP because DEQ has no data available for discharge during the summer months.

Table 40. New Meadows WWTP Load Allocation.

Location	Load allocation (cfu/day)	NPDES[a] Permit Number
New Meadows WWTP	1.70 E 9	ID 002315-9

Reserve

An explicit reserve for future growth has not been set aside within the TMDL. Any increased discharge from future growth or development within the watershed should be consistent with these allocations.

Reasonable Assurance

There is reasonable assurance that implementation, as the next step of the water body management process, will occur. Idaho's water quality standards identify designated agencies that are responsible for evaluating and modifying best management practices to protect impaired water bodies. The state has committed itself to having implementation plans developed within 18 months of EPA approval of the TMDL document. DEQ, the Watershed Advisory Group (WAG), and the designated agencies will develop implementation plans, and DEQ will incorporate them into the state's water quality management plan. Also, in measuring the effectiveness of an implementation activity, DEQ will reassess the support status of the water body to determine if the water body has reached full support status. If full support status has not been obtained, then further implementation will be necessary and further reassessment performed until full support status is reached. Monitoring will be done at least every five years. If full support status is reached, then the requirements of the TMDL will be considered completed.

Construction Storm Water and TMDL Waste Load Allocations

Construction Storm Water

The Clean Water Act requires operators of construction sites to obtain permit coverage to discharge storm water to a water body or to a municipal storm sewer. In Idaho, EPA has issued a general permit for storm water discharges from construction sites. In the past storm water was treated as a non-point source of pollutants. However, because storm water can be managed on site through management practices or when discharged through a discrete conveyance such as a storm sewer, it now requires a National Pollution Discharge Elimination System (NPDES) Permit.

The Construction General Permit (CGP)

If a construction project disturbs more than one acre of land (or is part of larger common development) that will disturb more than one acre), the operator is required to apply for permit coverage from EPA after developing a site-specific Storm Water Pollution Prevention Plan.

Storm Water Pollution Prevention Plan (SWPPP)

In order to obtain the Construction General Permit operators must develop a site-specific Storm Water Pollution Prevention Plan. The operator must document the erosion, sediment, and pollution controls they intend to use, inspect the controls periodically and maintain the best management practices (BMPs) through the life of the project

Construction Storm Water Requirements

When a stream is on Idaho's § 303(d) list and has a TMDL developed, DEQ now incorporates a gross waste load allocation (WLA) for anticipated construction storm water activities, if possible. TMDLs developed in the past did not have a WLA for construction storm water activities. All TMDLs will also be considered in compliance with provisions of the TMDL if they obtain a CGP under the NPDES program and implement the appropriate Best Management Practices.

Typically there are specific requirements you must follow to be consistent with any local pollutant allocations. Many communities throughout Idaho are currently developing rules for post-construction storm water management. Sediment is usually the main pollutant of concern in storm water from construction sites. The application of specific best management practices from *Idaho's Catalog of Storm Water Best Management Practices for Idaho Cities and Counties* is generally sufficient to meet the standards and requirements of the General Construction Permit, unless local ordinances have more stringent and site specific standards that are applicable. It is presumed that if the requirements of the general construction permit are met than the load allocations for this TMDL will be met as well.

WAG Consultation

DEQ has complied with the WAG consultation requirements set forth in Idaho Code § 39-3611. A WAG was officially formed in May 2004 for the Little Salmon River TMDL. DEQ provided the WAG with information concerning applicable water quality standards, water quality data, monitoring, assessments, reports, procedures, and schedules. The Little Salmon River WAG was officially recognized by DEQ in May of 2004. The group met regularly over the course of the development of the TMDL in New Meadows. In 2005, the WAG met January 31st, April 5th, June 14th, August 23rd, September 15th and December 8th. In 2004, the WAG met on May 17th , July 12th and September 15th.

DEQ utilized the knowledge, expertise, experience and information of the WAG in developing this TMDL. DEQ also provided the WAG with an adequate opportunity to participate in drafting the TMDL, reviewing draft versions of the TMDL and suggesting changes to the document.

Concern from some WAG members was expressed at the high reductions required for Big Creek for bacteria. In particular, those WAG members wondered if these reductions were possible. A WAG member pointed out that the E. coli present from the largely grass fed cows in the Meadows Valley area are far less virulent then the strains of E. coli that are excreted from grain fed cows.

At the end of the September 15, 2005 meeting of the Little Salmon River WAG, the WAG members present voted their approval to go out for public comment with the Little Salmon River TMDL. A public meeting was held on November 10th, 2005. The three WAG members present at a meeting on February 9, 2006 voted their approval to submit the final draft to EPA. Since a majority was not present, a majority vote was solicited by DEQ by mail and email. A majority vote was obtained on February 22nd .

One WAG voting member voted against submitting the TMDL to EPA because he felt that the sections on Mud Creek, Three Mile Creek, Four Mile Creek, Six Mile Creek and Martin Creek were impaired for beneficial uses and that additional data needed to be collected to ascertain whether on not this is the case. He stated that there had been significant discussion of these creeks and whether or not they were impaired but additional monitoring was not conducted during the course of TMDL development.

He stated that Kirk Campbell from the Idaho Department of Agriculture in his report "Little Salmon River Year Two Water Quality Report April 2005 through October 2005" that beneficial uses are impaired from data he collected on the Four Mile Creek site as well as other sites to be higher amounts than what meets the state tolerances. Mr. Campbell also stated at the December

2005 WAG meeting that Four Mile Creek was impaired rather than undetermined. The WAG member stated at that meeting that Leslie Freeman from DEQ would check into the alternatives of listing Three Mile, Four Mile and Martin Creek. That has not been done to this member's satisfaction.

The WAG member went on to state that these creeks are likely to be elevated nutrient/bacteria/temperature transporting streams that flow into the Little Salmon River as described by Kirk Campbell in his report on Four Mile Creek because of their similarity.

Also, DEQ did not include information in the TMDL on proposed monitoring in 2006 of Four Mile, Three Mile, Martin, Squaw and Six Mile Creeks (monitoring that was supported by a vote of the WAG). The member also stated that DEQ did not clearly delineate that lack of information prevented the agency from making a beneficial use support status call on the lower reaches of these creeks (see section 2 for more details on these specific streams). In addition, 2005 monitoring information was not presented in the TMDL.

The Idaho Department of Agriculture will monitor those streams if they can obtain access to them from the landowners in 2006. The WAG member emphasized that documentation of whether or not access was granted by landowners needed to occur in the TMDL in order to lend credibility to the document. Four Mile Creek was monitored sporadically in 2005 and not enough data was collected to make a determination of beneficial use impairment or unimpairment. This past and future monitoring will help delineate nutrient/bacteria loading to the system for the purposes of implementation planning for the mainstem Little Salmon River. If information regarding beneficial use impairment is gathered during this monitoring, it may be submitted to DEQ for 303(d) (integrated report) listing.

5.5 Implementation Strategies

DEQ recognizes that implementation strategies for TMDLs may need to be modified if monitoring shows that the TMDL goals are not being met or significant progress is not being made toward achieving the goals.

Time Frame

Implementation of the TMDL goals will likely rely partly on riparian management in the Little Salmon River watershed. Shrubs can take from 5 years to several decades to mature to their full size. Thus, the timeline for implementation will range from 5-25 years depending upon the BMP selected and the time necessary for the BMP to reach full efficiency.

Approach

The goal of the CWA and its associated administrative rules for Idaho is that water quality standards shall be met or that all feasible steps will be taken towards achieving the highest quality water attainable. This is a long-term goal in this watershed, particularly because nonpoint sources are the primary concern. To achieve this goal, implementation must commence as soon as possible. The approaches used will rely on the best practicable method for the Little Salmon River watershed taking into account cost, efficiency, practicality and applicability. Riparian management will likely be a large part of the temperature TMDL and will also play a role in the nutrient and bacteria TMDLs. The approaches will be more explicitly outlined in the implementation plan.

The TMDL is a numerical loading that sets pollutant levels such that in-stream water quality standards are met and designated beneficial uses are supported. DEQ recognizes that the TMDL is calculated from mathematical models and other analytical techniques designed to simulate and/or predict very complex physical, chemical, and biological processes. Models and some other analytical techniques are simplifications of these complex processes and, while they are useful in interpreting data and in predicting trends in water quality, they are unlikely to produce an exact prediction of how streams and other water bodies will respond to the application of various management measures. It is for this reason that the TMDL has been established with a MOS.

Following this TMDL submission, in accordance with approved state schedules and protocols, a detailed implementation plan will be prepared for pollutant sources. Implementation strategies will be decided upon by designated agencies and individual landowners to best suit the particular watershed. Implementation typically includes activities like bank stabilization, riparian improvements, grazing management plans, conservation planning, fencing, off-site watering, and road improvements.

For nonpoint sources, DEQ also expects that implementation plans be implemented as soon as practicable. However, DEQ recognizes that it may take some time, from several years to several decades, to fully implement the appropriate management practices. DEQ also recognizes that it may take additional time after implementation has been accomplished before the management practices identified in the implementation plans become fully effective in reducing and controlling pollution.

In addition, DEQ recognizes that it is possible that after application of all reasonable best management practices, some TMDLs or their associated targets and surrogates cannot be achieved as originally established. DEQ will review monitoring data every five years after implementation commences and make determinations regarding whether the TMDL targets need to be modified. Nevertheless, it is DEQ’s expectation that nonpoint sources make a good faith effort to achieving their respective load allocations in the shortest practicable time.
DEQ recognizes that expedited implementation of TMDLs will be socially and economically challenging.

Further, there is a desire to *minimize* economic impacts as much as possible when protecting water quality and beneficial uses. DEQ will rely on landowners and designated agencies to select best management practices that are effective and economically feasible for the watershed. DEQ further recognizes that, despite the best and most sincere efforts, natural events beyond the control of humans may interfere with or delay attainment of the TMDL and/or its associated targets and surrogates. Such events could be, but are not limited to floods, fire, insect infestations, and drought. Should such events occur that negate all BMP activities, the appropriateness of reimplementing BMPs will be addressed on a case by case basis. In any case, post event conditions should not be exacerbated by management activities that would hinder the natural recovery of the system.

For some pollutants, pollutant surrogates (i.e. shading for temperature) have been defined as targets for meeting the TMDLs. It is the expectation, however, that the specific implementation plan will address how human activities will be managed to achieve the water quality targets and surrogates. If a nonpoint source that is covered by the TMDL complies with its finalized implementation plan, it will be considered in compliance with the TMDL.

DEQ intends to regularly review progress of the implementation plan. If DEQ determines the implementation plan has been fully implemented, that all feasible management practices have reached maximum expected effectiveness, but a TMDL or its interim targets have not been achieved, DEQ may reopen the TMDL and adjust it or its interim targets.

The implementation of TMDLs and the associated plan is enforceable under the applicable provisions of the water quality standards for point and nonpoint sources by DEQ and other state agencies and local governments in Idaho under specific circumstances. However, it is envisioned that sufficient initiative exists on the part of local stakeholders to achieve water quality goals with minimal enforcement. Should the need for additional effort emerge, it is expected that the responsible agency will work with stakeholders to overcome impediments to progress through education, technical support, or enforcement.

In employing an adaptive management approach to the TMDL and the implementation plan, DEQ has the following expectations and intentions:

- Subject to available resources, DEQ intends to review the progress of the TMDLs and the implementation plans on a five-year basis.
- DEQ expects that designated agencies will also monitor and document their progress in implementing the provisions of the implementation plans for those pollutant sources for which they are responsible. This information will be provided to DEQ for use in reviewing the TMDL.
- DEQ expects that designated agencies will identify benchmarks for the attainment of TMDL targets and surrogates as part of the specific implementation plans being developed. These benchmarks will be used to measure progress toward the goals outlined in the TMDL.
- DEQ expects designated agencies to revise the components of their implementation plan to address deficiencies where implementation of the specific management techniques are found to be inadequate.

If DEQ, in consultation with the designated agencies, concludes that all feasible steps have been taken to meet the TMDL and its associated targets and surrogates, and that the TMDL, or the associated targets and surrogates are not practicable, the TMDL may be reopened and revised as appropriate. DEQ would also consider reopening the TMDL should new information become available indicating that the TMDL or its associated targets and/or surrogates should be modified. This decision will be made based on the availability of resources at DEQ.

Responsible Parties

Responsible parties include local landowners, planned unit developments, Adams and Idaho counties, the city of New Meadows, the USFS, the BLM, and the Idaho Department of Lands. Agencies involved in water quality improvement projects include the NRCS, Idaho Association of Soil Conservation Districts, Idaho Fish and Game, the Bureau of Reclamation, the Idaho Soil

Conservation Commission, the Idaho Department of Agriculture and DEQ. The Nez Perce Tribe is also actively involved in water quality improvement projects in the watershed.

Monitoring Strategy

The monitoring plan developed by the Idaho Department of Agriculture will also be suitable for post implementation monitoring of nutrients and bacteria. Monitoring for temperature can occur with aerial photo analysis or on the ground shading measurements using a solar pathfinder. The actual monitoring schedule and monitoring plan will be outlined in more detail in the implementation plan once BMPs are selected and a timeline for implementation is developed.

The objectives of a monitoring effort are to demonstrate long-term recovery, better understand natural variability, track implementation of projects and BMPs, and track effectiveness of TMDL implementation. This monitoring and feedback mechanism is a major component of the “reasonable assurance of implementation” for the TMDL implementation plan.

The implementation plan will be tracked by accounting for the numbers, types, and locations of projects, BMPs, educational activities, or other actions taken to improve or protect water quality. The mechanism for tracking specific implementation efforts will be annual reports to be submitted to DEQ.

The “monitoring and evaluation” component has two basic categories:
- Tracking the implementation progress of specific implementation plans; and
- Tracking the progress of improving water quality through monitoring physical, chemical, and biological parameters.

Monitoring plans will provide information on progress being made toward achieving TMDL allocations and achieving water quality standards, and will help in the interim evaluation of progress as described under the adaptive management approach.

Implementation plan monitoring has two major components:
- Watershed monitoring
- BMP monitoring.

The designated agencies have primary responsibility for BMP monitoring while DEQ has primary responsibility for watershed monitoring.

5.6 Conclusions

Water quality in the Little Salmon River can be improved and beneficial uses such as cold water aquatic life improved if a concerted effort is made to reduce both nonpoint and point source pollution. This document provides the information necessary to develop an implementation plan that will achieve restoration of beneficial uses.

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